

WHAT IS CLAIMED IS:

1 1. A system for monitoring an industrial process, the system
2 comprising a computer program product, the product comprising;
3 a code directed to accessing a process controller;
4 a code directed to an input module coupled to code directed to the process
5 controller, the input module code being adapted to input a plurality of parameters
6 from a process for manufacture of a substance;
7 a code directed to a computer aided process module coupled to the process
8 controller, the computer aided process module code being adapted to compare at least
9 two of the plurality of parameters against a predetermined training set of parameters,
10 and being adapted to determine if the at least two of the plurality of parameters are
11 within a predetermined range of the training set of parameters; and
12 a code directed to an output module coupled to the process controller, the
13 output module being adapted to output a result based upon the determining step.

1 2. The system of claim 1 wherein the substance is selected from a
2 petroleum product, a chemical product, a food product, a health product, a cleaning
3 product, a biological product, and other fluid or objects.

1 3. The system of claim 1 wherein the plurality of parameters are
2 selected from an intrinsic element or an extrinsic element of the process.

1 4. The system of claim 1 wherein the input module code, the
2 computer aided process module code, and the output module code are provided in a single
3 computer software program.

1 5. The system of claim 1 wherein the computer aided module code
2 includes an algorithm selected from PCA, HCA, KNN CV KNN Prd, SIMCA CV,
3 SIMCA Prd, Canon Prd, Fisher CV, and SCREAM.

1 6. The system of claim 1 further comprising a code directed to
2 normalizing coupled to the process controller, the normalizing code being adapted to
3 normalize each of the plurality of parameters before input into the computer aided process
4 module.

1 7. The system of claim 1 wherein the training step of parameters are
2 preprocessed in at least two of the computer aided processes.

1 8. The system of claim 1 wherein the result is an affirmative response
2 or a negative response, where the response is displayed on a terminal.

1 9. The system of claim 1 wherein the computer aided process is
2 selected from a library comprising a plurality of processes.

1 10. The system of claim 9 wherein the plurality of processes includes
2 at least a comparing process, a contrasting process, and a functional process.

1 11. A system for monitoring an industrial process for the manufacture
2 of materials or objects, the system comprising a computer code product, the product
3 comprising:

4 a code directed to an input module, the input module code being adapted to
5 input a plurality of process parameters from a process for manufacture of a substance
6 or object;

7 a code directed to a library module coupled to the input module code, the
8 library module code including a plurality of computer aided processes, each of the
9 computer aided processes being capable of determining an output based upon a
10 predetermined training set of the plurality of process parameters;

11 a code directed to an output module coupled to the library module code,
12 the output module code being adapted to output a result based upon the predetermined
13 training set and the plurality of process parameters; wherein each of the computer
14 aided processes compares at least two of the plurality of process parameters against a
15 portion of the training set of parameters and determines if the at least two of the
16 plurality of process parameters are within a predetermined range of the portion of the
17 training set of parameters.

1 12. A system for monitoring a process, the system comprising a
2 computer program product, the product comprising:

3 a code directed to storing a first model in memory;

4 a code directed to acquiring data from a process;

5 a code directed to applying the first model to the data to identify a first
6 predicted descriptor characteristic of a state of the process; and
7 a code directed to consulting a first knowledge based system to provide an
8 output based upon the first predicted descriptor.

1 13. The product of claim 12 wherein the model is constructed from a
2 mathematical equation describing a physical law.

1 14. The product of claim 12 further comprising preprocessing the data
2 prior to applying the model.

1 15. The product of claim 12 wherein the output is communicated to the
2 process to adjust an operational parameter of the process.

1 16. The product of claim 12 wherein the output is communicated to an
2 operator to permit monitoring of the state of the process.

1 17. The product of claim 12 wherein the output is resident on a server
2 and accessible to a user over a network of computers utilizing a browser software
3 program.

1 18. The product of claim 17 wherein the input is acquired from the
2 process over a network of computers

1 19. The product of claim 12 wherein the input is acquired from the
2 process over a network of computers.

1 20. The product of claim 12 wherein the output is communicated over
2 a network of computers to an associated system, the associated system including at least
3 one of a legacy system, an e-enterprise system, and a desktop application.

1 21. The product of claim 12 wherein the first knowledge based system
2 is an expert system.

1 22. The product of claim 12 further comprising:
2 a code directed to acquiring initial data from a source at a first time;
3 a code directed to converting the initial data into electronic form;
4 a code directed to loading the initial data into memory;

5 a code directed to retrieving the initial data from memory;
6 a code directed to acquiring subsequent data from the source at a second
7 time;
8 a code directed to assigning a first descriptor to the initial data and a
9 second descriptor to the subsequent data;
10 a code directed to constructing the model based upon the initial data, the
11 subsequent data, the first descriptor, and the second descriptor; and
12 a code directed to storing the model in memory.

1 23. The product of claim 22 wherein the model is constructed from at
2 least one of a univariate statistical technique, a multivariate statistical technique, a time
3 series analysis, and a neural-based approach.

1 24. The product of claim 22 wherein the model is constructed from one
2 of a group of different algorithms or models stored in a library.

1 25. The product of claim 22 wherein the source is in communication
2 with the process, the initial data and the subsequent data reflecting prior operation of the
3 process.

1 26. The product of claim 22 wherein the source is in communication
2 with a second process similar to the process, the initial data and the subsequent data
3 reflecting operation of the second process.

1 27. The product of claim 22 further comprising:
2 a code directed to constructing a second model;
3 a code directed to storing the second model in memory;
4 a code directed to applying the second model to the process data to
5 identify a second predicted descriptor characteristic of the process data; and
6 a code directed to consulting the knowledge based system to produce the
7 output based on the first predicted descriptor and the second predicted descriptor.

1 28. The product of claim 27 wherein the second model is constructed
2 based upon the initial data, the subsequent data, the first descriptor, and the second
3 descriptor, such that comparison of the first descriptor and the second descriptor
4 represents a cross-validation.

1 29. The product of claim 27 wherein the second model is constructed
2 from operation of a second process similar to the process, such that comparison of the
3 first descriptor to the second descriptor represents an external validation..

1 30. The product of claim 27 wherein the knowledge based system is an
2 expert system.

1 31. The product of claim 12 further comprising code configured to
2 receive key preliminary information and to communicate the key preliminary information
3 downstream to the code applying the first model, such that the first predicted descriptor
4 reflects the key preliminary information.

1 32. A method for monitoring a process, the method comprising:
2 storing a first model in a memory;
3 acquiring data from a process;
4 applying the first model to the data to identify a first predicted descriptor
5 characteristic of a state of the process; and
6 consulting a first knowledge based system to provide an output based upon
7 the first predicted descriptor.

1 33. The method of claim 32 wherein the model is constructed from a
2 mathematical equation describing a physical law.

1 34. The method of claim 32 further comprising preprocessing the data
2 prior to applying the model.

1 35. The method of claim 32 wherein the output is communicated to the
2 process to adjust an operational parameter of the process.

1 36. The method of claim 32 wherein the output is communicated to a
2 human operator to permit monitoring of the process.

1 37. The method of claim 32 wherein the output is resident on a server
2 and accessible to a user through a browser software program.

1 38. The product of claim 37 wherein the input is acquired from the
2 process over a network of computers

1 39. The product of claim 32 wherein the input is acquired from the
2 process over a network of computers..

1 40. The method of claim 32 wherein the output is communicated over
2 a network to an associated system, the associated system including at least one of a legacy
3 system, an e-enterprise system, and a desktop application.

1 41. The method of claim 32 wherein the first knowledge based system
2 is an expert system.

1 42. The method of claim 32 further comprising:
2 acquiring initial data from a source at a first time;
3 converting the initial data into electronic form;
4 loading the initial data into memory;
5 retrieving the initial data from memory;
6 acquiring subsequent data from the source at a second time;
7 assigning a first descriptor to the initial data and a second descriptor to the
8 subsequent data;
9 constructing the model based upon the initial data, the subsequent data, the
10 first descriptor, and the second descriptor; and
11 storing the model in memory.

1 43. The method of claim 42 wherein the model is constructed from one
2 of a univariate statistical technique, a multivariate statistical technique, and a time series
3 analysis.

1 44. The method of claim 42 wherein the model is constructed from one
2 of a group of different algorithms stored in a library.

1 45. The method of claim 42 wherein the source is in communication
2 with the process, the initial data and the subsequent data reflecting prior operation of the
3 process.

1 46. The method of claim 42 wherein the source is in communication
2 with a second process similar to the process, the initial data and the subsequent data
3 reflecting operation of the second process.

1 54. The product of claim 52 wherein the process manager is a server in
2 communication with a user through a network of computers utilizing a browser software
3 program.

1 55. The product of claim 54 wherein the process manager is in
2 communication with the first field mounted device via the computer network.

1 56. The system of claim 52 further comprising a second field mounted
2 device receiving the output and adjusting an operational parameter of the process
3 according to the output.

1 57. The system of claim 52 further comprising an interface between the
2 process manager and an associated system including at least one of a legacy system, an e-
3 enterprise system, and a desktop application.

1 58. The system of claim 52 wherein the first knowledge based system
2 is an expert system.

1 59. The system of claim 52 wherein the model is constructed utilizing
2 one of a univariate statistical technique, a multivariate statistical technique, a time series
3 analysis, and a neural-based technique.

1 60. The system of claim 52 further comprising a library configured to
2 store one of a group of different algorithms utilized to construct the first model.

1 61. The system of claim 52 further comprising a library configured to
2 store one of a group of different algorithms utilized to construct the first model.

1 62. The system of claim 52 further comprising:
2 a second model; and
3 a second knowledge based system, the process manager applying the
4 second model to the data to identify a second predicted descriptor characteristic of the
5 process data, the second knowledge based system submitting one of the first predicted
6 descriptor and the second predicted descriptor to the first knowledge based system where
7 the first predicted descriptor is different from the second predicted descriptor.